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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,626	09/12/2003	Shen-Ping Wang	0941-0840P	6139

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EXAMINER	
THOMAS, BRANDI N	

ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/660,626	WANG ET AL.	
	Examiner	Art Unit	
	Brandi N. Thomas	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Detailed Action*.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 9-17, 19-27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (6204080 B1) in view of Nguyen et al. (2005/0014361 A1).

Regarding claims 1, 10, and 20, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers, comprising the steps of: providing a first sacrificial layer (145) having a first silicon material (col. 10, lines 33-38); and forming a second sacrificial layer (215) having a second silicon material on the hydrogenated surface of the first sacrificial layer (145) (col. 12, lines 6-67 and col. 13, line 1) but does not specifically disclose performing a hydrogen treatment on the first sacrificial layer to form a hydrogenated surface thereon. Nguyen discloses performing a hydrogen treatment on the first sacrificial layer to form a hydrogenated surface thereon (section 0042). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the hydrogen treatment of Nguyen et al. for the purpose of cleaning contaminants from the exposed surface (sections 0042 and 0044). Regarding claim 20, Hwang further discloses, in figure 9D, a micromechanical structural layer (300) above a substrate (101) (figure 9D).

Regarding claims 2, 11, and 21, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers, wherein the first silicon material is amorphous silicon or silicon crystalline (col. 10, lines 36-38).

Regarding claims 3, 12, and 22, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers, wherein the second silicon material is amorphous silicon or silicon crystalline (col. 13, lines 5-7).

Regarding claims 4, 14, and 24, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers but does not specifically disclose the hydrogen treatment being a hydrogen plasma treatment. Nguyen et al. discloses wherein the hydrogen treatment being a hydrogen plasma treatment (section 0042). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the hydrogen plasma treatment of Nguyen et al. for the purpose of chemically mechanically depositing organosilicon material while applying RF power (sections 0027 and 0042).

Regarding claims 5, 15, and 25, Hwang discloses the claimed invention but does not specifically disclose the operation conditions of the hydrogen plasma treatments. Nguyen et al. discloses a method of preventing peeling between two silicon layers, wherein operational conditions of the hydrogen plasma treatment comprise an RF power of 50~300 Watts (section 0042), a hydrogen gas glow of 200~2000 sccm (section 0042), an operating temperature of 300~400^{0}C, an operating time of 30~90 sec (section 0043) and an operating pressure of 0.1~10 torr (section 0043). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the operation condition

of the hydrogen plasma treatment of Nguyen et al. for the purpose of properly cleaning the contaminants depending on the size of the substrate and layers being used (section 0043 and 0044).

Regarding claims 6, 16, and 26, Hwang discloses the claimed invention but does not specifically disclose the operation conditions of the hydrogen plasma treatments. Nguyen et al. discloses a method of preventing peeling between two silicon layers, wherein operational conditions of the hydrogen plasma treatment comprise an RF power of 200 Watts (section 0042), a hydrogen gas glow of 60 sccm (section 0042), an operating temperature of 320^0C, an operating time of 60 sec (section 0043) and an operating pressure of 0.8 torr (section 0043). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the operation condition of the hydrogen plasma treatment of Nguyen et al. for the purpose of properly cleaning the contaminants depending on the size of the substrate and layers being used (section 0043 and 0044).

Regarding claims 7, 17, and 27, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers, wherein the hydrogen plasma treatment is an HF vapor treatment (col. 13, lines 47-49).

Regarding claims 9 and 19, Nguyen et al. discloses a method of preventing peeling between two silicon layers, wherein the hydrogen plasma treatment and the formation of the second layer are preformed in the same processing chamber (sections 0043 and 0044).

Regarding claims 13, 23 and 29, Hwang discloses a method of preventing peeling between two silicon layers in the microelectromechanical structure (MEMS), wherein the second layer is formed by CVD using SiH^4 as a reaction gas (col. 10, lines 44-58).

3. Claims 8, 18, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang (6204080 B1) in view of Nguyen et al. (2005/0014361 A1) as applied to claim 1 above, and further in view of Chinn et al. (2004/0033639).

Regarding claims 8, 18, and 28, Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers but does not specifically disclose the HF vapor using HF (49wt%) with a ration of H2O: HF = 30:1~70:1. Chinn et al. discloses a method of preventing peeling between two silicon layers, wherein the HF vapor used HF (49wt%) with a ratio of H_2O: HF = 30:1 ~ 70:1 (section 0076). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the ration of Chinn et al. for the purpose of maintaining a specific temperature to prevent condensation (section 0076).

4. Claims 30-40, 42-54, 56, and 57 rejected under 35 U.S.C. 103(a) as being unpatentable over Huibers et al. (6741383) in view of Hwang (6204080 B1) in further view of Nguyen et al. (2005/0014361 A1).

Regarding claims 30 and 44, Huibers et al. discloses, in figures 4 and 5A-5C, a method of forming a micromirror structure, comprising the steps of: forming a first sacrificial silicon layer (512) on a substrate (511) (col. 9, lines 4-5); forming a mirror plate (513) on part of the first sacrificial silicon layer (512) (col. 8, lines 53-54 and col. 9, line 5); forming a second sacrificial silicon layer (514) over the mirror plate (513) and the first sacrificial silicon layer (512) (col. 9, lines 10-14); forming at least one hole (516 and 518) penetrating the second sacrificial silicon layer (514), the mirror plate (513) and the first sacrificial silicon layer (512) (col. 9, lines 23-27);

filling a conductive material in the hole (516 and 518) to define a mirror support structure (515) attached to the mirror plate (513) and the substrate (511) (col. 9, lines 36-42); and removing the first and second sacrificial layers (512 and 514) to release the mirror plate (513) (col. 9, lines 40-45) but does not specifically disclose performing an inert gas sputtering on the mirror plate and the first sacrificial silicon layer; performing a hydrogen treatment on the first sacrificial silicon layer to form an H-treated silicon surface thereon. Hwang discloses, in figures 5D and 9A-9D, performing an inert gas sputtering on the mirror plate (71) and the first sacrificial silicon layer (54) (col. 5, lines 36-48). Nguyen discloses performing a hydrogen treatment on the first sacrificial layer to form a hydrogenated surface thereon (section 0042). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the inert sputtering of Hwang for the purpose of creating bonded hydroxyl groups on to remove residues (col.5, lines 36-48 and col. 13, lines 47-49) and the hydrogen treatment of Nguyen et al. for the purpose of cleaning contaminants from the exposed surface (sections 0042 and 0044).

Regarding claims 31 and 45, Huibers et al. discloses a method of forming a micromirror structure, wherein the substrate (511) is a glass or quartz substrate (col. 8, lines 40-45).

Regarding claims 32 and 46, Huibers et al. discloses the claimed invention but does not specifically disclose the first silicon material is amorphous silicon or silicon crystalline. Hwang discloses, in figures 9A-9D, a method of forming a micromirror structure, wherein the first silicon material is amorphous silicon or silicon crystalline (col. 10, lines 36-38). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was

made to combine the device of Huibers et al. with the silicon of Hwang for the purpose of having an even surface (col. 10, lines 36-38).

Regarding claims 33 and 47, Huibers et al. discloses the claimed invention but does not specifically disclose the second silicon material is amorphous silicon or silicon crystalline. Hwang discloses, in figures 9A-9D, a method of forming a micromirror structure, wherein the second silicon material is amorphous silicon or silicon crystalline (col. 13, lines 5-7). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the silicon of Hwang for the purpose of having an even surface (col. 13, lines 5-7).

Regarding claims 34 and 48, Huibers et al. discloses the claimed invention but does not specifically disclose the second layer is formed by CVD using SiH^4 as a reaction gas. Hwang discloses a method of forming a micromirror structure, wherein the second layer is formed by CVD using SiH^4 as a reaction gas (col. 10, lines 44-58). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the CVD of Hwang for the purpose of the layers having a specific thickness (col. 10, lines 44-58).

Regarding claims 35 and 49, Huibers et al. and Hwang discloses the claimed invention but does not specifically disclose gas sputtering is argon sputtering. It would have been obvious to use argon, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use (In re Leshin, 125 USPQ 416). Therefore it would have been obvious to one having ordinary skill in the art at the time the

invention was made to use argon for the purpose of its capability to be weld and cut, to blanket reactive elements, and as a protective (nonreactive) atmosphere for growing crystals of silicon.

Regarding claims 36 and 50, Huibers et al. discloses the claimed invention but does not specifically disclose the hydrogen treatment being a hydrogen plasma treatment. Nguyen et al. discloses wherein the hydrogen treatment being a hydrogen plasma treatment (section 0042). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the hydrogen plasma treatment of Nguyen et al. for the purpose of chemically mechanically depositing organosilicon material while applying RF power (sections 0027 and 0042).

Regarding claims 37 and 51, Huibers et al. discloses the claimed invention but does not specifically disclose the operation conditions of the hydrogen plasma treatments. Nguyen et al. discloses a method of preventing peeling between two silicon layers, wherein operational conditions of the hydrogen plasma treatment comprise an RF power of 50~300 Watts (section 0042), a hydrogen gas glow of 200~2000 sccm (section 0042), an operating temperature of 300~400^{0}C, an operating time of 30~90 sec (section 0043) and an operating pressure of 0.1~10 torr (section 0043). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the operation condition of the hydrogen plasma treatment of Nguyen et al. for the purpose of properly cleaning the contaminants depending on the size of the substrate and layers being used (section 0043 and 0044).

Regarding claims 38 and 52, Huibers et al. discloses the claimed invention but does not specifically disclose the operation conditions of the hydrogen plasma treatments. Nguyen et al.

discloses a method of preventing peeling between two silicon layers, wherein operational conditions of the hydrogen plasma treatment comprise an RF power of 200 Watts (section 0042), a hydrogen gas glow of 60 sccm (section 0042), an operating temperature of 320^0C, an operating time of 60 sec (section 0043) and an operating pressure of 0.8 torr (section 0043). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the operation condition of the hydrogen plasma treatment of Nguyen et al. for the purpose of properly cleaning the contaminants depending on the size of the substrate and layers being used (section 0043 and 0044).

Regarding claims 39 and 53, Huibers et al. discloses the claimed invention but does not specifically disclose the hydrogen plasma treatment and the formation of the second layer are preformed in the same processing chamber. Nguyen et al. discloses a method of preventing peeling between two silicon layers, wherein the hydrogen plasma treatment and the formation of the second layer are preformed in the same processing chamber (sections 0043 and 0044). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the Hydrogen plasma treatment of Nguyen for the purpose removing the sacrificial layer (sections 0043 and 0044).

Regarding claims 40 and 54, Huibers et al. discloses the claimed invention but does not specifically disclose the hydrogen plasma treatment is an HF vapor treatment. Hwang discloses, in figures 9A-9D, a method of preventing peeling between two silicon layers, wherein the hydrogen plasma treatment is an HF vapor treatment (col. 13; lines 47-49). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to

combine the device of Huibers et al. with the HF vapor treatment of Hwang for the purpose removing the sacrificial layer (col. 13, lines 47-49).

Regarding claims 42 and 56, Huibers et al. discloses the claimed invention but does not specifically disclose the mirror plate is an OMO. Hwang discloses a method of forming a micromirror structure, wherein the mirror plate is an OMO (col. 9, lines 44-49). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the mirror plate of Hwang for the purpose of metals reflective capabilities (col. 9, lines 44-49).

Regarding claims 43 and 57, Huibers et al. discloses the claimed invention but does not specifically disclose the conductive material comprises at least one of W, Mo, Ti, and Ta. Hwang discloses a method of forming a micromirror structure, wherein the conductive material comprises at least one of W, Mo, Ti, and Ta (col. 9, lines49-52). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Huibers et al. with the conductive material of Hwang for the purpose transmitting the first signal (col. 9, lines49-52).

5. Claims 41 and 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huibers et al. (6741383) in view of Hwang (6204080 B1) in view of Nguyen et al. (2005/0014361 A1) as applied to claim 30 above, and further in view of Chinn et al. (2004/0033639).

Regarding claims 41 and 55, Huibers et al., Hwang, and Nguyen et al. disclose the claimed invention but does not specifically disclose the HF vapor using HF (49wt%) with a ration of H2O: HF = 30:1~70:1. Chinn et al. discloses a method of preventing peeling between

two silicon layers, wherein the HF vapor used HF (49wt%) with a ratio of H_2O: HF = 30:1 ~ 70:1 (section 0076). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the device of Hwang with the ration of Chinn et al. for the purpose of maintaining a specific temperature to prevent condensation (section 0076).

Response to Arguments

6. Applicant's arguments with respect to claims 1-57 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Fonash et al. (2003/0157783) discloses methods for preparing a removable system on a mother substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brandi N. Thomas whose telephone number is 571-272-2341. The examiner can normally be reached on 7- 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Mack can be reached on 571-272-2333. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BNT
March 6, 2006

RICKY MACK
SUPERVISORY PATENT EXAMINER